November 1955 Vol. 5 No. 6

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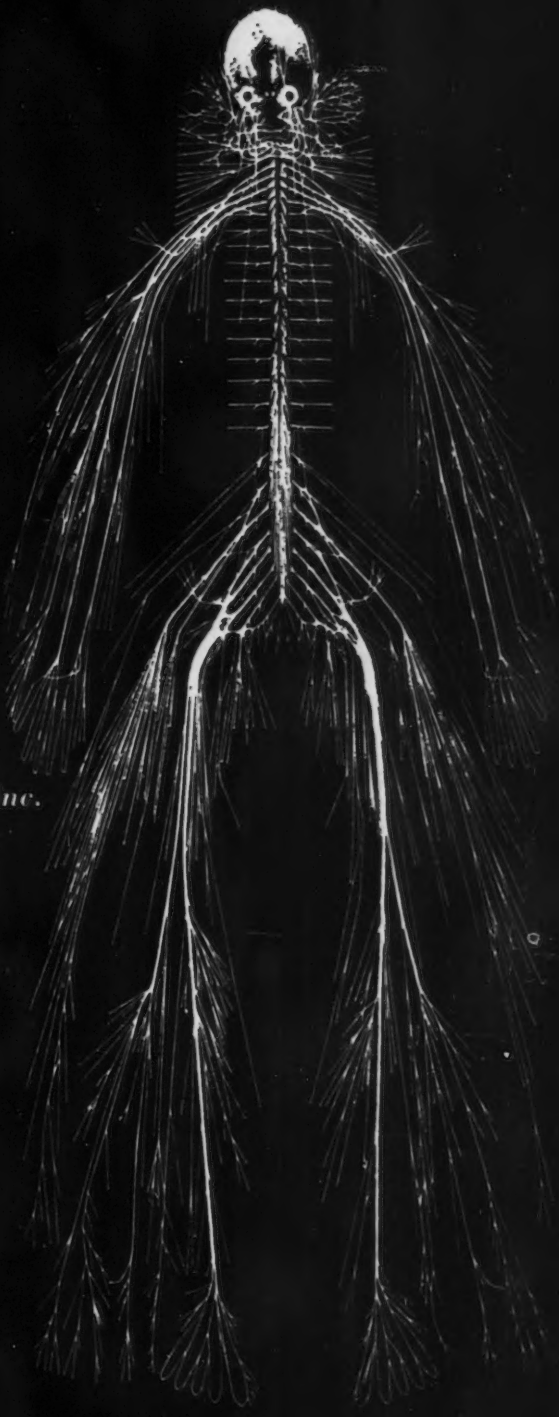
a Bulletin of

Cancer Progress

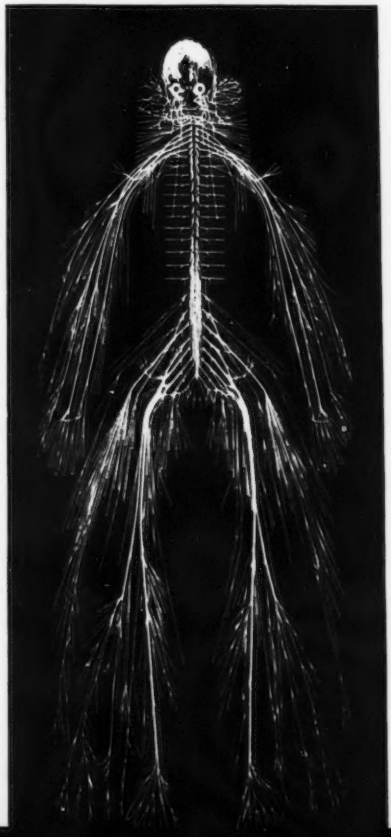
Published by the
American Cancer Society, Inc.



painless (practically) charity

Nowhere in the world do voluntary health and welfare agencies flourish as they do in the United States. They are a characteristically democratic way of getting certain things done. And nowhere in the world is medical care freer of the heavy hand of government than it is in America. These two circumstances are not coincidental, for much of what is done in the field of health by government in other countries is done by private enterprise—the voluntary agencies—in our own. In the light of the effectiveness of these national social forces in maintaining the principles of medical care as we have known it, it is strange indeed that physicians in some quarters are indifferent to their future.

For the future of the voluntary health movement in America is in jeopardy. It is in jeopardy for the most paradoxical of reasons. In the land of the free there is a well-organized and ruthless effort to deny to the people their right to choose freely how they shall give expression to the flower of virtues—charity. This effort is called by a variety of names, but, because it seeks to do away with independent appeals for support by the individual voluntary agencies, it is generally known as *federated* or *united* giving. There are three major reasons why the American Cancer Society declines to join in federated or "give once for all" drives. The most important is that by so doing it loses its identity and when that happens the life-saving facts about cancer, which are part and parcel of its separate fund drive, are necessarily submerged in the murmur of numerous other causes. Second, experience has shown beyond argument that the Cancer Society can raise more money on its own for its program of education, service to patients, and research than it can in an omnibus appeal in which it is practically anonymous. Finally, to take away from a free and intelligent people their privilege — indeed, their duty — to exercise judgment in their philanthropy is to relieve the conscience of one more responsibility, the social and personal consequences of which are not pleasant to consider. It behooves every doctor in the land to ponder well the fate of his allies—the voluntary health agencies.



The cover illustration is a photograph of the complete cerebrospinal nervous system preserved in the Museum of the Hahnemann Medical College of Philadelphia. The dissection was carried out in 1888 by Dr. Rufus B. Weaver, Professor of Anatomy, and is believed to be the only one in existence.

NEWSLETTER

NOVEMBER, 1955

The Atoms for Peace Conference, formally known as the International Conference on the Peaceful Uses of Atomic Energy, produced few if any surprises -- except that it actually was held -- and little if anything new. Scientists of seventy-two nations came together in Geneva, August 8-20, to talk about the atom -- where it could be found, what it did, and how it could be used for purposes other than blowing cities to smithereens. It finally had penetrated the Iron Curtain -- not in the bomb bay of a heavy jet plane, but in 1124 papers and numerous exhibits.

One would gather from all the talk that this little aggregation of particles had only two purposes in its short or long life -- (1) as a tracer in living and inert systems and (2) as the arch enemy of cancer. The Mr. Hyde side of its character was ignored.

Shields Warren of Boston, an official American delegate, summed up the principal benefits and results of the conference in this way: "All of us were extremely pleased about the extensive use of atomic energy in biology and medicine in so many countries. Russia's work with fertilizers with isotope techniques is as well done as anywhere in the world. Russia also gave a very good report on cobalt as a trace element in the productivity of certain crops. The United Kingdom was very impressive, and the Canadians have made an excellent contribution in radiocobalt therapy. However, relatively few new facts have come to our attention that could alter the direction of our research or that would aid materially in the completion of research now under way. Without meaning to seem self-satisfied or chauvinistic, I'm pretty well convinced that America has not fallen behind in this field."

Here are random reports from the conference:

Maisin (Louvain) gives 6-month-old rats a lethal dose of radiation (700-850 r), but by shielding the thorax he saves 25 per cent and by shielding the abdomen almost 100 per cent. He finds that 17.5 per cent of the thorax-shielded,

and 3.5 per cent of the abdomen-shielded, rats develop any of a great variety of cancers six months after irradiation. Similar results are obtained when cysteinamine is used prophylactically before irradiation.

Haddow (Chester Beatty Group, London) described the radiomimetic effects of the haloalkylamine and sulfur mustards, diepoxides, ethyleneimines, and dimethanesulphonyloxyalkanes as being often indistinguishable from those of ionizing radiations. These chemicals, like radiation, gray the hair, suppress growth, cause cancer, bring mutations, and have several other effects similar to those of ionizing radiation, he reported.

Lawrence (U. of Calif.) reported that the median survival of more than 230 polycythemia-vera patients treated with radiophosphorus over the last twenty years is 13.2 years, double the survival of those treated with conventional methods. There was no increase in leukemic deaths over those found when treatment was with other methods. Radiophosphorus was much less spectacular in white-cell conditions.

Clark (U. of Calif.) looked into the histories of thirteen youngsters less than 15 years of age with thyroid carcinoma and found that all of them had irradiation in childhood for thymus, tonsil, adenoid, and other throat trouble. He said that thyroid cancer among youngsters had increased in proportion to the use of radiation for childhood throat conditions, and he added that the correlation suggested cause and effect.

Canadians announced that the new 200,000-kw. NRU reactor at Chalk River will have five times the power of the NRX, which has served so well. The NRU will cost about $49 million, go into operation in 1956, and, as with the NRX, be used by other countries. It will serve three main purposes, enabling Canada (1) to maintain her position as a leader in basic and nuclear research, (2) to produce large quantities of highly active isotopes, and (3) to turn out significant amounts of plutonium, reactor fuel. Like NRX, it will use natural uranium for fuel in its 200 rods and heavy water as a moderator.

J. H. Muller (U. of Zurich) described the use of radioactive colloidal gold, intravenously, directly into tumors and surrounding tissues, and into the larger body cavities, in several cancers, especially ovarian. He de-

(Continued after page 216)

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NOVEMBER 1955 VOL. 5, NO. 6

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Published bimonthly by
AMERICAN CANCER SOCIETY, INC.
New York, N. Y.

Annual Subscription $2.50

Special bulk rate to organizations other than Divisions subscribing in quantities of 200 or more.

Keeping up

Palliation of Cancer

The available methods for the management of advanced cancer include surgery, radiotherapy, chemotherapy, hormone control, symptomatic relief by drugs, and combinations of these measures. Among the palliative surgical procedures are resection of the esophagus, multivisceral abdominal and pelvic resections, gonadectomy, adrenalectomy, hypophysectomy, local nerve sections, cordotomy, and leukotomy. Radiotherapy is to be preferred to surgery in stage-III cancer of the breast. Technical developments in radiology — megavolt apparatus, rotation therapy, the linear accelerator, cobalt units, and the several radioisotopes — have rendered radiotherapy more flexible, more effective, safer, and less distressing to the patient. Among the chemotherapeutic agents of palliative use are nitrogen mustard, especially the oral form; triethylenemelamine; myleran; the folic acid antagonists; and ACTH and cortisone. Some cancers of the breast and prostate are palliated by hormones—estrogens in cancer of the prostate and in cancer of the breast in postmenopausal women but not in men and androgens in mammary cancer in premenopausal women but not in men. Administration of cortisone has made bilateral adrenalectomy and hypophysectomy available as last-resort palliative procedures in hormone-dependent tumors. Morphine and its derivatives remain the most important drugs for relief of pain. The family doctor balances the probable benefits from these specialized forms of treatment against the concomitant discomforts and disabilities and, considering the patient's mental distress, his fear of treatment, his desire to live, the severity of the symptoms, his age, and his probable life expectancy, decides for or against these palliative procedures.

Cade, S.: The management of advanced cancer. Proc. Roy. Soc. Med. 48: 373-376, May, 1955.

Carcinoma in Situ

"It is not true that a pathological condition must be either cancer or not cancer. It may be neither the one nor the other. It may be in the process of becoming cancer."—Ewing. Such pathological changes are being recognized more commonly in the present emphasis on early detection of cancer and the more widespread use of screening procedures. Currently the problem of carcinoma in situ concerns chiefly the uterine cervix, but it is not confined to this site. Since the histopathological change may not be grossly evident, the sampling method must provide an adequate examination of the surface epithelium in the critical area. Probably 25 per cent of cancers in situ and even more dysplastic changes in the uterine cervix are missed by conventional biopsy. The specimen may not include the critical site; the fragile surface epithelium may be lost or distorted; the specimen may be inadequately studied by the pathologist. Conization is the sampling method of choice. The cervical canal should not be previously dilated. This avoids damaging the mucosal lining of the canal. Care should be taken not to dislodge and lose the critical mucosa of the portio vaginalis. The entire conized specimen is embedded and examined by multiple transections. In addition

with Cancer

to carcinoma in situ many cases of dysplasia or atypical hyperplasia are detected in screening procedures and may be dealt with by a more conservative approach. Comparable changes in experimental animals do not always proceed to invasive cancer after withdrawal of the carcinogen. At present it cannot be proved either that all invasive cancer of the cervix is preceded by cancer in situ or that all untreated cancer in situ will eventually become invasive, but the evidence is strongly suggestive that cancer in situ is a developmental stage of invasive cancer of the cervix.

Reagan, J. W.: Carcinoma in situ and the pathologist. [Editorial.] Am. J. Clin. Path. 25: 791-794, July, 1955.

Coin Lesions of the Lung

Since laboratory and roentgen-ray procedures usually fail in definitive diagnosis of the so-called coin lesions of the lung, prompt surgical exploration for removal of the nodule for pathological study is indicated. From 15 to 30 per cent of these lesions are malignant, and in selected older age groups this percentage may reach seventy. Apparent presence of calcium does not rule out cancer nor contraindicate exploratory thoracotomy — a benign procedure just as important and logical as biopsy of a breast nodule. The pulmonary nodule should be removed for definite diagnosis. It should not be watched for changes, nor should thoracotomy be delayed for a time-consuming clinical diagnostic work-up, for, if the lesion is malignant, metastases may develop, making successful surgery impossible. The general medical profession and the public must be educated to think of thoracotomy as biopsy of the lung, ranking in importance along with biopsy for cancer of any other site.

Trimble, H. G.: Pulmonary "coin" lesions; medical and pathologic aspects. Am. J. Surg. 89: 408-416, Feb., 1955.

Colposcopic Diagnosis of Cervical Cancer

Colposcopic examination is considered to be a valuable accessory procedure in the diagnosis of cervical carcinoma. The colposcope is a binocular instrument with a magnifying optical system of lenses, mounted on a stand with a transformer in the base, which makes possible stereoscopic visualization of the cervix under magnification with direct illumination. The instrument may detect lesions missed by gross examination and also aids in determining the best site for biopsy. By colposcopic visualization, squamous epithelium is roseate and smooth with very fine vessels, whereas columnar epithelium appears pale and grapelike and bruises easily. Columnar epithelium, which is shiny because of overlying mucus, may be more easily visualized by the application of 3 per cent acetic acid. Normal squamous epithelium stains brown with aqueous iodine, but true erosion, ectropion, leukoplakia, and glandular, atypical, and malignant tissues do not. In the case of true erosion, the connective tissue and vessels can be observed directly. Nabothian cysts lying under a layer of squamous epithelium are characteristic. The epithelium is thickened from irritation and the surface bulges from inner pressure and appears

whitish yellow. In trichomonal vaginitis, clusters or ovoids of tiny distended capillaries and petechial hemorrhages are seen. Leukoplakia is characterized by profuse reddish dots on a whitish-yellow field, with a depressed surface and a sharp border, or by polygonal whitish-yellow fields bordered by red lines. In malignant lesions of the cervix, blood vessels are irregular, with corkscrew arrangements, and the normal direction from the periphery toward the external os is noticeably changed. Areas of true erosion with heavy vascularization and glassy necrotic areas with a yellowish background are common. Typical red areas with thin surface epithelium and inflammatory infiltration are seen frequently, as are red or uneven transition zones, with small gland openings surrounded by leukoplakic rings.

Scheffey, L. C.; Bolten, K. A., and Lang, W. R.: Colposcopy; aid in diagnosis of cervical cancer. Obst. & Gynec. 5: 294-306, March, 1955.

Treatment of Skin Cancer

The type, size, anatomical location, and other complicating factors in basal- and squamous-cell cancer of the skin determine the choice of therapeutic modality—ionizing radiation, electrosurgery, or scalpel surgery. Cancers on the face and other areas requiring good cosmetic effect are best treated with some form of ionizing radiation. With roentgen rays protracted treatment is to be preferred to single massive dosage. Although not so popular as formerly, radium is still chosen when the radiations must be restricted to the tumor, without undue exposure of the underlying tissues. Proper manipulation of radium in the treatment of skin cancer requires thorough training and long experience. Leukoplakia, solar keratoses, and early and superficial cancers of the skin are best treated by electrocoagulation. Broad, flat, extremely superficial basal-cell carcinoma may be treated by electrocautery. Cancers projecting from the surface and those on the rim of the ear may be excised with the electric knife, using the cutting current. Almost all skin cancers can be removed by surgical excision, which is the best treatment for those cancers refractory to one course of irradiation. For primary, malignant melanoma, wide excision with prophylactic dissection of the regional lymph nodes gives best results. The absolute necessity of frequent follow-up examination is emphasized.

Traenkle, H. L.: The treatment of skin cancer. New York State J. Med. 55: 2060-2063, July 15, 1955.

Cancer of the Male Breast

Carcinoma of the breast in the male differs essentially from that in the female only in its prognosis, which is poor. Of the twelve cases at Harper Hospital, Detroit, seen since 1921, two of four patients who had radical mastectomies more than ten years ago have survived; three others have survived after radical mastectomies performed ten, eight, and six years ago. Carcinoma of the male breast usually involves the skin very early, necessitating wide excision by a radical Halsted operation with split-thickness grafts. There were no local recurrences in this series. None of these cases was associated with estrogenic therapy of prostatic carcinoma. The average delay in reporting for treatment, after discovery by the patient of a lump in the breast, was nearly two years. Checking of the male breast as regularly as the female breast is recommended.

Jackson, P. P., and Munnell, E. R.: Carcinoma of the male breast. Canad. M. A. J. 72: 814-815, June 1, 1955.

Stomach Cancer

Through the Central Tumor Registry of the Royal Victoria Hospital, Montreal, a 100 per cent complete follow-up was done on 427 consecutive patients with gastric carcinoma admitted from 1941 through 1950. Thirty-five of the 298 patients seen before 1948 are living (11.7 per cent). The five-year–survival rate was highest (18 per cent) in the 45- to 49-year group; the rate was 16.7 per cent in the group between 35 and 39 years of age. The most commonly occurring symptoms were weight loss, abdominal pain or discomfort, vomiting, and constipation. A palpable

mass was present in 28 per cent of the cases. Patients with symptoms for more than a year survived longest. It would seem that there are two clinical types of cancer of the stomach; one, a rapid, severe, and usually fatal disease, and the other, a chronic, slow-growing type that is more amenable to curative treatment. The most valuable diagnostic procedure was the barium meal, which revealed the diagnosis in 92 per cent of the cases. Total gastrectomy carried a high operative mortality: the longest survival was three years. In the subtotal resections for cure there was a 37.5 per cent, and for palliation a 19.5 per cent, five-year survival. Lymph-node metastases were present in 34.3 per cent of the curative, and in 65.8 per cent of the palliative, resections. Of the patients with lymph-node involvement, 10.6 per cent lived for five years; of those without lymph-node involvement, 36.7 per cent lived for five years.

Moore, J. R., and Morton, H. S.: Gastric carcinoma; a statistical review of 427 cases of carcinoma of the stomach from 1941 through 1950. Ann. Surg. 141: 185-192, Feb., 1955.

Circumcision and Cancer of the Penis and Cervix

Cancers of the penis and of the uterine cervix are rare in Jews and infrequent in Moslems of India. The one common denominator of these two dissimilar peoples is ritual circumcision—Jews on the eighth day and Mohammedans between the fourth and ninth years of life. Among the Hindus of India, who do not practice circumcision, cancers of the penis and cervix are more frequent than among their circumcising Moslem neighbors. Similarly, the genital cancer rates of the circumcised Fijians are lower than those of the uncircumcised Indians of these islands. The rarity of cervical cancer among nuns further suggests some carcinogenic agent peculiar to the uncircumcised penis as the causative agent. Smegma is now thought to be the probable carcinogen. Smegma of horses, a species with a high rate of penile cancer, is carcinogenic to the skin of mice. Studies of the role of *Mycobacterium smegmatis* have so far yielded suggestive but inconclusive results. Although the evidence for circumcision is not entirely complete, this routine practice among newborn males must be regarded as justifiable prophylaxis against penile and cervical cancer.

Israel, S. L.: Relative infrequency of cervical carcinoma in Jewish women: is the enigma solved? [Editorial.] Obst. & Gynec. 5: 358-360, March, 1955.

A Novel Hysterectomy

The fibroelastic tube encasing the cervical mucosa is dissected out intact through an abdominal approach without entering the cervical canal; the tube remains attached to the removed corpus uteri. This dissection is continued downward to include the external os. This total removal of all the secretory elements of the cervix leaves no hazard of cancer. The resulting stump is simply a solid muscular column preserving the very important supporting action of the cervix in maintaining the pelvic floor and sparing the ageing patient the distressing prolapse that sometimes follows conventional total hysterectomy. A special knife facilitates this new operative procedure.

Joseph, M.: New concept of total hysterectomy and anatomy of the cervix. Am. J. Surg. 89: 608-610, March, 1955.

Prognosis in Hodgkin's Disease

From a study of 227 cases of Hodgkin's disease at Middlesex Hospital from 1930 to 1952, it was concluded that prognosis depends on the stage of the disease at the time of presentation, the age at onset, the sex of the patient, the histological appearance, and the complications. All patients in histological Grade 1 were alive five years after diagnosis. No Grade-3 patient survived this period. It was not possible to decide from microscopic appearance whether a patient would fare better or worse than the average within that grade. Best survival rates were found in women in the third and fourth decades. Complications and intercurrent diseases are often overlooked as inescapable manifestations of the primary condition. Among the complications encountered in this series were

pregnancy, blood abnormalities, secondary infection, intrathoracic and intra-abdominal spread, duodenal ulcer, and nervous-system involvement. Herpes zoster occurred in twenty-seven patients, in twenty-five of whom exacerbations of the underlying Hodgkin's disease followed within three months. Hodgkin's disease is almost invariably fatal. Although irradiation was the main method of treatment, the cytotoxic poisons, mostly nitrogen mustard, are being used with increasing frequency, but with no notable prognostic advantage over roentgen-ray therapy.

Jelliffe, A. M., and Thomson, A. D.: The prognosis in Hodgkin's disease. Brit. J. Cancer 9: 21-36, March, 1955.

Au^{198} in Cancer

The experience of these authors confirms that of others concerning the value of intracavitary application of radioactive gold in treatment of serous effusions, peritoneal and pleural, caused by malignant disease. Interstitial Au^{198} is indicated in malignant tumors that tend to spread via the lymphatics or are locally invasive and not in those that are rapidly and widely disseminated by the blood stream. Neither should Au^{198} be used as a method of irradiation in cases in which the roentgen ray can be applied effectively. The only toxic side reaction noted was hypoplasia of the bone marrow in four patients receiving more than 50 mc. Thus, with doses of 50 mc. or more, complete blood counts should be done every week for three months. Other than this potential hazard to the hematopoietic system, Au^{198} was found free of any detectible toxicity. Among the advantages of Au^{198} over more conventional methods of radiation therapy are the following: its short-range ionizations directly within the tumor, producing sharper localization of radiation; its greater effectiveness in lesions so deep-seated as to be beyond the scope of other radiation therapy, because of the limits of tolerance of the surrounding and overlying normal tissues; the absence of associated radiation sickness; its higher permissible dosages; its simplicity of administration; and its more uniform field of radiation.

Wheeler, H. B.; Jaques, W. E., and Botsford, T. W.: Experiences with the use of radioactive colloidal gold in the treatment of cancer. Ann. Surg. 141: 208-217, Feb., 1955.

Vaginal-Smear Sites

Papanicolaou recommends sampling for vaginal exfoliative cytological examination from the vaginal fornix, the cervical canal, and the intrauterine cavity—sites yielding only exfoliated cells. Ayre goes beyond exfoliative cytology by scraping the portio vaginalis with a wooden spatula. At the Chicago Lying-In Hospital three or four smears are taken on every patient: (1) from the vaginal fornix by a wooden spatula without scraping; (2) from the portio vaginalis by a wooden spatula with slight scraping; (3) from the cervical canal by a wet cotton applicator with slight rotation; and, (4) if endometrial cancer is suspected, from the intrauterine cavity by endometrial aspiration under sterile conditions with a bent, blunt cannula on a glass syringe. Evaluation of these four smear sites for suitability for cancer screening was made on fifty clinically evident cervical cancers, fifty subclinical early invasive and noninvasive cervical cancers, and fifty dysplastic lesions. Eleven of the fifty patients with early invasive and noninvasive cancer showed no dyskaryotic or abnormal cells in the smears from the fornix, and diagnosis of cancer would have been missed except for the smears from the other sites.

Wied, G. L.: Importance of the site from which vaginal cytologic smears are taken. Am. J. Clin. Path. 25: 742-750, July, 1955.

at a glance . . .

one-minute abstracts of the current literature on cancer . . .

Intracranial Gliomas

The British Medical Research Council recently issued a report (No. 284): *Intracranial Gliomata.* Statistical analysis of 298 cases showed that 54 per cent were glioblastomas, 33 per cent astrocytomas, 6 per cent medulloblastomas, 5 per cent oligodendrogliomas, and 1 per cent ependymomas. Glioblastomas and astrocytomas are twice as common in males as in females. An age graph for incidence of intracranial gliomas shows two peaks, at 0 to 9 and at 45 to 54 years. The left cerebral hemisphere was involved four times to the right's three. The tumors were supratentorial in 230 cases and infratentorial in sixty-eight. In the first decade infratentorial tumors are four times as common as supratentorial. The lobes involved were, in order of frequency, temporal, frontal, parietal, and occipital. Symptoms were, in order of frequency, headache, papilledema, vomiting, and epilepsy. There was radiological abnormality in 60 per cent of the cases; 50 per cent showed evidence of raised intracranial pressure. Only four of 247 patients subjected to ventriculography showed no abnormality. All of the eighty-nine patients receiving no treatment died within seven years, more than half within three months, and another two fifths within three years. The longest survivals were in the cerebellar group, the shorter in the cerebral and brain-stem group, and the shortest in the corpus-callosum group. Treatment had a favorable influence in but a minority of cases. In only fifty-two of the eighty-five patients who lived one year or more after admission to the hospital and who had been treated by surgery and radiation was the survival considered to be worth while. Recent neurosurgical advances, therefore, have little promise for the patient with intracranial glioma.

Anon.: Intracranial gliomata. Brit. M. J. 1: 339-340, Feb. 5, 1955.

Restricted Ocular Motility

A study is presented of the etiological factors affecting 122 patients less than 16 years of age who had acquired disturbances in the ability to move the eyes or eyelids. In the absence of evidence of intracranial inflammation, otitis media, trauma, or myasthenia gravis, a child with a sixth-nerve palsy (unilateral or bilateral and with or without seventh-nerve involvement) is a brain-tumor suspect. Increased intracranial pressure manifested by chok-

ing of the discs should suggest a cerebellar tumor in such a child. Absence of increased intracranial pressure implicates a tumor of the pons. If, in the latter case, there is involvement of the third nerve, the diagnosis of pontine tumor is reasonably certain. The child with a predominantly third-nerve lesion, in the absence of encephalitis, should be considered as having a pontine or mesencephalic tumor. In cases of episodic third-nerve palsy associated with ipsilateral head pain, the diagnosis of ophthalmoplegic migraine should be entertained provided air studies and arteriography are negative. The child who keeps his eyes fixed in relatively one position of gaze should suggest a cortical irritation, in which case, meningitis or abscess formation is the most likely possibility. Vascular tumor of the cortex and subdural hematoma should also be considered. Intracranial tumors represented approximately 70 per cent of the 122 cases studied; inflammatory lesions, 11 per cent; and myasthenia gravis, 6 per cent. At the time of writing this article, the author reports an over-all mortality rate of 70 per cent. Seventy-seven of the eighty-four deaths were caused by intracranial tumors. This grave implication of an acquired disturbance in ocular motility makes careful evaluation of every patient mandatory.

Murray, R. G.: The diagnostic significance of restricted ocular motility in children. J. Neurosurg. 12: 278-286, May, 1955.

Atypical Facial Neuralgia

Of all the clinical syndromes in which pain is a predominant characteristic, tic douloureux in its classical form perhaps is the easiest to recognize. Owing to the very typical nature of the painful attacks, the diagnosis is seldom mistaken. On the other hand, facial pain of atypical form frequently is dismissed as a form of tic douloureux. A careful evaluation of the character and distribution of the pain and the absence of the usual dolorogenic or TRIGGER zone will aid in the differentiation. If, in addition, there is unmistakable involvement of the motor or sensory function of the trigeminal nerve, the diagnosis of tic douloureux should be avoided. When the function of any of the cranial nerves in the paratrigeminal area or in the cerebellopontine angle is impaired, the diagnosis of tumor involvement of the fifth cranial nerve becomes highly tenable, and exploration is necessary. Exposure of the gasserian ganglion often reveals a neoplasm that can be either biopsied or removed. Surgical exploration of the ganglion gives the opportunity to confirm the diagnosis, to remove tumor for microscopic confirmation, and at the same time to section the posterior root for more prolonged relief of pain. Roentgen-ray therapy has given little significant relief of pain or prolongation of survival. It is obvious that the management in such cases of malignant tumor of the ganglion involves only an attempt to afford palliation.

Meacham, W. F., and Holbrook, T. J.: Atypical facial neuralgia due to tumors of the gasserian ganglion. Am. Surgeon 20: 834-839, Aug., 1954.

Roentgen-Ray Localization of Brain Tumors

The majority of brain tumors can be localized by various types of neurological and radiological procedures. The most exact but also the most dangerous method for determining the site of an intracranial growth is ventriculography, effective in approximately 90 per cent of instances. Listing techniques in order of simplicity, safety, and practical utility, however, the neurological examination came first, with accuracy in 61 per cent of cases. The residue of unlocalized tumors was then narrowed by other methods (arranged in order of increasing disturbance and hazard to the patient): electroencephalographic study contributed another 6 per cent of sites; ordinary skull roentgenograms, 6.2 per cent; the pneumoencephalogram, 0.8 per cent; cerebral angiogram, 4 per cent; and the ventriculogram, 20 per cent. Routine radiographic examination of the skull (without special preparation) deserves wide application because of simplicity and occasional dramatic success. Although the location of only one in five lesions known to exist is revealed by this

method, the nature and size as well as the location of the tumor are sometimes shown. Cerebral angiography after injection of the carotid system with an opaque medium is remarkably accurate in locating certain types of growth: meningothelioma has been detected in thirty-seven of forty trials and glioblastoma multiforme in fifty-six of seventy-nine. Ventriculography, in which pneumatization is done by direct ventricular puncture, should yield reliable localizing signs in nine of ten cases including intracranial tumors of all sorts. Neoplasms of the posterior fossa are especially well depicted: forty-three medulloblastomas in a series of forty-five were localized by ventriculographic study. However, the procedure is traumatic and measurably perilous. Risks may not always be justified if a diagnosis can be established with reasonable assurance in other ways.

Hodges, F. J.; Holt, J. F.; Bassett, R. C., and Lemmen, L. J.: Reliability of brain tumor localization by roentgen methods. Am. J. Roentgenol. 71: 624-629; disc. 629-631, April, 1954.

Early Diagnosis of Spinal Tumors

Because of the location of most primary spinal tumors, symptoms are usually gradual in onset, appearing several months before physical signs. The course is much more rapid with secondary growths, and paraplegia may be noted within days after the appearance of the first symptoms. Pain occurs in approximately 80 per cent of patients, but temporary remissions, especially with cauda equina tumors, are not uncommon. Root pain may be aching or lancinating and is referred to the dermatome. Straining or coughing often aggravates the discomfort. A dull central backache that persists in spite of rest may also be noted. Other disturbances of sensation may include numbness, burning, or tingling. Power loss may take place initially, particularly with intramedullary tumors, but usually occurs some time after sensory disturbances. Loss of sphincter control is a late manifestation. Physical signs, such as a stiff spine, scoliosis, or erector spinae spasm, should be investigated. The effects of straight leg-raising and of jugular compression are tested. Sensory loss, weakness, wasting, and reflex changes may aid localization of the lesion. Occasionally, no physical signs can be elicited, even though a tumor is found. In slightly less than half the patients, plain spinal roentgenograms may reveal changes, such as gross vertebral destruction, pedicle and lamina erosion, widening of the intervertebral foramina, and posterior scalloping of the vertebral bodies. Myelographic examination is valuable for final localization or for excluding neoplasm in suspicious cases. A lumbar puncture will reveal some abnormality in almost every case and should not be withheld except with rapidly progressive disease or when cervical-cord tumor is suspected. Several conditions may be confused with spinal tumor. Every effort should be made to differentiate prolapsed intervertebral disk, neurosis, disseminated sclerosis, and visceral disease within the chest and abdomen. Laminectomy is performed as soon as the definite diagnosis and localization are established. Most neurofibromas can be totally removed with complete recovery, while other tumors can be only partially excised or decompressed. These should be treated with radiation postoperatively.

Bloom, H. J. G.; Ellis, H., and Jennett, W. B.: The early diagnosis of spinal tumours. Brit. M. J. 1: 10-16, Jan. 1, 1955.

Radiation Injury to Central Nervous System

Former ideas concerning the very high radioresistance of the central nervous system are disappearing in the face of several recent studies showing that the effect of radiation on nerve tissue is similar to that on any other tissue, although perhaps less definitively demonstrable. A similar effect on the vascular system, resulting in impaired blood supply to the central nervous system, constitutes a further, delayed cause of injury. Ample autopsy evidence has accumulated to indicate the advisability of reduction of dosages in roentgenray therapy of tumors of the central nervous system. The brain stem and the hypothalamus have been shown to be particu-

larly radiosensitive, the paraventricular and supraoptic nuclei undergoing marked histological alteration from moderate doses of radiation after a period of several months. The polarizing microscope demonstrates early myelin changes that cannot be shown by the conventional microscope. This loss of optical activity of myelin is a direct effect of the roentgen rays and is not secondary to vascular damage. Thus are explained the increasingly frequent reports in recent years of injury to the central nervous system, often fatal, following roentgen-ray therapy of intracranial and extracranial tumors.

Krabbenhoft, K. L.: Radiation injury of the central nervous system. [Editorial.] Am. J. Roentgenol. 73: 850-852, May, 1955.

Benign Brain Tumors

In a group of 1814 verified intracranial tumors 862, or nearly half the total number, represented tumors that should be termed favorable as far as operability and a prolonged period of useful life are concerned. Ninety-six patients with pituitary adenomas who were not operated on but were given roentgen-ray treatment with improvement were also included. Three quarters of the survivors engaged in useful activities from one to twenty years postoperatively, the majority for five or more. Meningiomas, acoustic neuromas, many pituitary adenomas and cerebral hemangiomas, cerebellar astrocytomatous and hemangiomatous cysts, cholesteatomas, colloid cysts, some craniopharyngiomas, and other less common neoplasms can be completely excised. Some cerebral astrocytomas, a few oligodendrogliomas, and a small miscellaneous group of tumors can be radically although incompletely removed. Meningiomas composed the largest group of favorable benign tumors, and almost all could be extirpated. The mortality rate was about 13 per cent, but more than half the survivors lived for more than a year and slightly more than three fourths lived for more than five years. Pituitary adenomas constituted the second largest group of favorable tumors. In the majority the diagnosis was verified at surgery, but others were treated with radiation therapy when a large sella turcica together with visual-field defects and optic atrophy was noted. The operative-mortality rate was high (approximately 12 per cent) because many of the lesions were extensive. Improvement and maintenance of vision are good prognostic signs after surgery. About 70 per cent of survivors live usefully for five years. Of the total 766 patients who either survived operation or were relieved by roentgen-ray therapy, 592 have engaged in useful activities for one to twenty years—the majority for five years or more. This number represents 68.6 per cent of the original 862 patients and 77.2 per cent of the 766 who survived operation or were relieved by roentgen-ray therapy.

Horrax, G.: Benign (favorable) types of brain tumor; the end results (up to twenty years), with statistics of mortality and useful survival. New England J. Med. 250: 981-984, June 10, 1954.

von Recklinghausen's Disease

Plexiform neurofibroma of the orbit and lid with defects in the walls of the orbit and involvement of the central nervous system is a rare manifestation of von Recklinghausen's disease. In 1946, Peyton and Simmons collected twenty cases from the literature and added five of their own; all twenty-five had almost identical features. In the present case a 15-year-old Arab boy was admitted with a congenital deformity of the left upper lid that had gradually increased in size and became ptotic, covering the left eyeball completely. Upon examination, a clinical diagnosis of neurofibroma of the left upper lid with intracranial involvement was made. At operation, the tumor of the eyelid was carefully dissected from the skin and conjunctiva, although no definite demarcation was present. An orbital growth the size of an egg was freed from the surrounding tissue and removed. The pathologist's report confirmed the diagnosis of von Recklinghausen's disease. The postoperative course was uneventful. As to the nature of the intracranial growth, in the few cases from the literature in which au-

topsy had been done, it had revealed a glioma, type astrocytoma. In the case reported, a craniotomy was not attempted. It was felt that so long as the patient showed no signs of increased intracranial pressure, a craniotomy was not indicated, since these tumors are slowly progressive and at best very difficult to remove surgically. This case revealed no signs of pituitary dysfunction in spite of the extreme ballooning of the sella turcica. The optic chiasm did not seem to be involved to any degree, since perimetry showed no visual defects. Furthermore, there was no gross involvement of the optic nerve and globe. The absence of pulsations in spite of the large defects in the walls of the orbit is of interest, and in this case it cannot be explained. The association of gliomas, gliosis, and meningiomas of the central nervous system with peripheral signs of von Recklinghausen's disease is well recognized. However, such an association with orbital involvement seems to be rare. Characteristic findings of this disease are: (1) an intracranial growth situated in the middle cranial fossa and extending to cause ballooning of the sella turcica; (2) a plexiform neurofibroma involving the orbit and very often the globe, the optic nerve, and the eyelids, with enlargement of the orbital cavity and defects in its walls; and (3) café au lait pigmentation of the skin. Occasionally typical neurofibromas are also found.

Sabri, J. A., and Diab, A.: Plexiform neurofibroma of orbit and lid with defects in walls of orbit and involvement of central nervous system. A. M. A. Arch. Ophthal. 52: 598-603, Oct., 1954.

Pediatric Neurological Disorders

One of the largest, if not the largest, pediatric neurology services in the United States, the Children's Division of the Cook County Hospital, Chicago, afforded the authors the opportunity to study and report on 282 neurological patients admitted to hospital during a twelve-month period, from June 1, 1953, to June 1, 1954. The bulk of neurological conditions in children encountered in hospital practice consists of acute disorders, in distinct contrast to neurological sequelae of the same conditions, encountered mainly in outpatient clinics. The various etiological groupings are presented in a temporal order, beginning with preconceptual conditions, i.e., hereditary; followed by prenatal, i.e., congenital malformations; then by paranatal, i.e., birth injuries; and lastly, by postnatal conditions (inflammations trauma, and vascular and neoplastic conditions). The neoplastic conditions included two cerebellar medulloblastomas, one neuroblastoma, one neurofibroma of von Recklinghausen, and two clinically diagnosed brain tumors. The following cases were reported: Two colored girls, 3 and 6 years old respectively, were admitted with ataxia and clinical, ophthalmological, radiological, and manometric evidence of increased intracranial pressure. A diagnosis of cerebellar tumor was made, and after operation a histological diagnosis of cerebellar medulloblastoma was established. Both patients died shortly after the surgical procedure. A 2-year-old white boy, admitted for radiation therapy of multiple metastatic tumors, notably of the face and head, that were diagnosed histologically as neuroblastoma, was discharged after completion of the course of therapy. A 1-year-old white girl with a tumor of the face that was diagnosed histologically as neurofibroma of von Recklinghausen was admitted with a significant family history. Her mother and maternal grandfather both suffered from the same condition. The fifth and sixth cases were those of a 7-year-old white girl and a 1-year-old colored boy respectively. A clinical diagnosis of brain tumor was made in each case, but they were not operated on. They were discharged and later lost to follow-up.

Friedman, A., and Levinson, A.: Neurologic disorders in children; a study of 282 hospital cases. Arch. Pediat. 72: 51-69, Feb., 1955.

The Morphology, Biological Behaviour, and Prognosis of Brain Tumours

Arthur R. Elvidge, M.D., C.M.

The central nervous system may be invaded by any one of a great variety of tumours. Besides the possibility of secondary invasion by extension and metastases, the central nervous system is frequently the seat of neoplasms arising primarily from elements of its own structure and its coverings.

Intracranial tumours may be divided into a number of principal groups (Table 1).

Gliomas

The gliomas form approximately 60 per cent of all brain tumours seen at a neurosurgical clinic. They arise from the ectodermal neuroglial cells, macroglia, that form the normal supportive tissue of the central nervous system. The microglia, which behave pathologically as mesodermal elements, have not been proved to form neoplastic growth.

The gliomas can be divided in various ways into subgroups (Table 2).

In order to understand their biological behaviour it is necessary to study the development of the normal glial cells as outlined in Fig. 1. In the writer's opinion, the general classification of Bailey and Cushing, based upon histogenesis, is the most satisfactory. Minor changes have been introduced in various clinics but the essential classification remains the same. The simplified classification of Kernohan, based principally upon malignancy, is preferred by some.

On rare occasions one may encounter a tumour derivative of the nerve-cell anlage, a ganglioneuroma or neuroblastoma of the brain. For the sake of completeness they are included with the gliomas in Table 1. The ganglioneuromas are relatively benign and a patient may live many years after removal of such a tumour.

Morphology, biological behaviour, and prognosis vary widely among the different glioma subgroups. An outline of the characteristics of the more common types follows.

The astrocytomas form one of the largest subgroups of the gliomas. The type cell is the adult astrocyte. The tumour has

TABLE 1

Intracranial Tumours with Relative Incidence in Approximately 1000 Cases

Type of tumour		%
Gliomas	64.0	64.4
Ganglioneuromas	0.4	
Meningiomas		14.0
Perineurial fibroblastomas		5.0
Blood-vessel tumours		4.0
Pituitary tumours, including craniopharyngiomas		6.9
Congenital tumours		0.7
Papillomas		0.5
Sarcomas		0.7
Metastatic tumours		6.6

TABLE 2

The Relative Incidence of Glioma Subgroups in 594 Cases

Type of tumour	%
Astrocytoma	24.0
Glioblastoma multiforme	46.4
Medulloblastoma	7.4
Astroblastoma	0.5
Ependymoma	5.0
Spongioblastoma polare	0.6
Oligodendroglioma / Oligodendroblastoma	2.5
Pinealoma	0.8
Neuroepithelioma	0.5
Unclassified	10.0

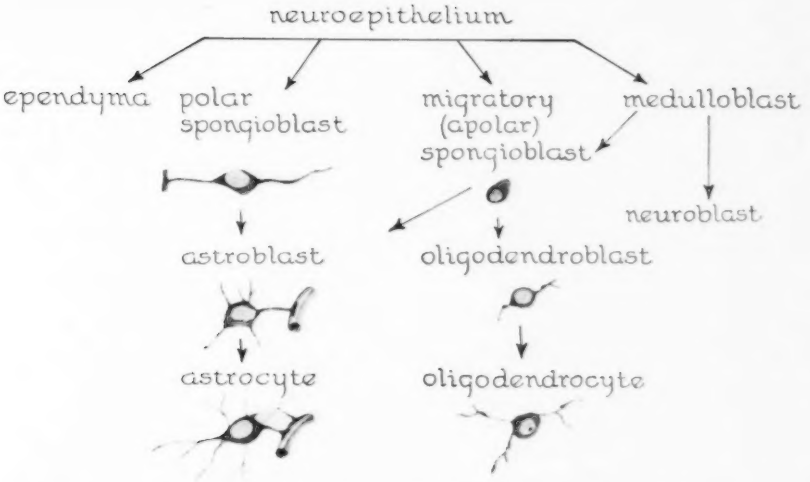

FIGURE 1. Development of glia. (After Penfield, 1931, from MOSELEY, H. F., Ed.: *Textbook of Surgery*, 2d ed., C. V. Mosby Co., 1955.)

been found to present such a variable picture that it has been found useful to subclassify it into at least three subgroups—piloid, gemistocytic, and diffuse.

In the first subgroup, which is the largest, the type cell is a piloid astrocyte, or a typical fibrous astrocyte forming fibrillae. The tumour may be made up of a dense feltwork or a loose meshwork of astrocytes.

On surgical exposure it may present at the cortical level as a shiny, translucent, discoloured, greyish mass or, if subcortical, it may appear to have widened the normal convolutions in the area. Dissection of the growth will show it to extend a considerable distance down through the white matter and to grow with finger-like processes. Sometimes, and in fact generally, one can outline a large portion of the mass by blunt dissection or finger removal, but the boundaries and extensions must be followed by suction removal to give a margin of safety. This usually results in a generous partial lobectomy. The consistency is often rubbery or elastic and the colour, off-white.

The astrocytomas may arise at any level of the nervous system (Fig. 2). They are common in the cerebral hemispheres and in the cerebellum. There are perhaps certain areas of predilection affecting their behaviour that may be listed as temporal, frontal, parietal, medial frontoparietal, central, region of the island of Reil, thalamus, third ventricle (Fig. 2), fourth ventricle, pons, cerebellum, and spinal cord.

They are frequently associated with cystic formation, and the tumour nodule may appear in the gliosed wall of the cyst (Fig. 3). The cyst always contains yellow fluid. Cysts occur in 40 per cent of cerebral, and in 75 per cent of cerebellar, cases.

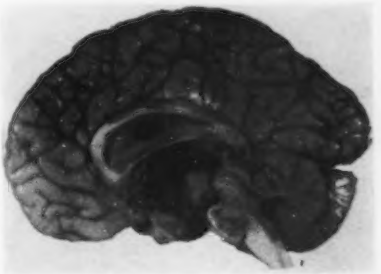

FIGURE 2. Glioma of third ventricle, unclassified.

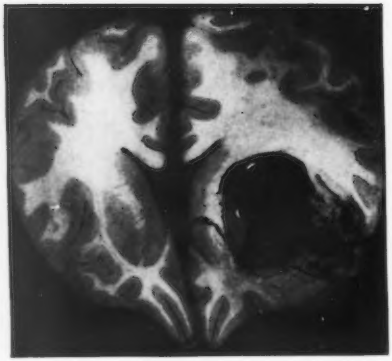

FIGURE 3. Piloid astrocytoma showing cyst with mural nodule and ventricular shift. (From MOSELEY, H. F., Ed.: *Textbook of Surgery*, 2d ed., C. V. Mosby Co., 1955.)

These tumours may be encountered at any age. The average age for cerebral cases is approximately 33 years. The age is younger in the cerebellar cases, being from 14 to 20 years or less.

On the average, symptoms are complained of for two and a half to four years before patients are referred for surgery. Symptoms may continue for years.

The results of operative treatment vary but on the whole are good in the case of radical removals and quite good in the case of partial removals.

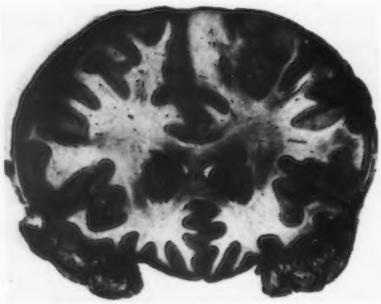

FIGURE 4. Gemistocytic astrocytoma in parasagittal location showing widening of convolutions with invasion of grey and white matter. (From MOSELEY, H. F., Ed.: *Textbook of Surgery*, 2d ed., C. V. Mosby Co., 1955.)

Twenty-year survival is not unusual after surgical removal. This is especially true in cerebellar cases. In cases of shorter survival the results of incomplete and of so-called complete removal have been very similar, probably because of incorrect reporting. It is difficult to judge the effect of roentgen-ray therapy in these cases. Disability after operation will, of course, depend upon many anatomical factors.

Even patients with tumours attached to the floor of the fourth ventricle may do well. With meticulous surgery it may be possible rarely to effect a complete removal. However, with adequate partial removal, sufficient at least to unblock the fourth ventricle and the aqueduct of Sylvius, a long survival can sometimes follow. A modified short-circuit operation after the manner of the Torkildsen procedure can be employed in lieu of or in addition to partial removal. On the whole, given a piloid astrocytoma in a reasonable location, the prognosis may be fairly good.

The type cell of the gemistocytic astrocytoma is a plump-cell astrocyte. These astrocytes produce fewer fibres. It is rare to find a tumour made up wholly of these cells, but, if the vast majority of the cells belong to this group, it is then classed as a gemistocytic astrocytoma. It is of some interest to speculate upon the cause and the reason for the swollen astrocyte. It may be merely an accident of poor blood supply or it may be due to a toxin rather than to a truly different type cell. However, the biological behaviour of these tumours is somewhat characteristic.

These tumours occur on the average at a slightly older age level, the average age being 38 years.

The usual preoperative symptomatology is shorter, two years, and the postoperative survival is not so favourable (see later) as in the case of the piloid.

We have found the gemistocytic astrocytomas only in the cerebral hemispheres. They also form cysts (22 per cent), though less frequently, but, when they do, these are usually intraneoplastic cysts and medium to small in size. They infiltrate

grey and white matter (Fig. 4) and widen convolutions, and, when the tumour appears at the cortical surface, it may have a pinkish or greyish translucent discolouration. It remains as a discrete growth but grows fairly rapidly. Fairly complete removals can be made, though the five-year–survival rate runs between 25 and 30 per cent. Few survive ten years.

The third subgroup of the series is the astrocytoma diffusum. The type cell is a small stellate astrocyte that does not form fibres except when invading the white matter, when the small astrocytes form fibrillae. The name refers to its tendency to invade insidiously the grey and white matter throughout the hemisphere, with a minimum of gross disturbance. It spreads beneath the pia, turning up here and there in various condensations of growth throughout the hemisphere. Mitotic figures are quite common. The cells grow in amongst the ganglion cells of the cortex without destroying them; thus at times a ganglioneuroma is suggested.

The limits of this tumour are difficult to recognize at operation and even at autopsy (Fig. 5). Even its presence may be difficult to determine. The ventriculogram may give evidence of a general shift of mid-line structures.

The cortical surface may be off-colour, more whitish yellow than normal. The tumour has a consistency slightly different from that of normal brain and can be separated to some extent, but much will remain unrecognizable and inseparable as neoplasm. It is therefore practically impossible to make a complete removal of this neoplasm. It is recognized clinically usually by epileptic fits that have occurred over a long period of time.

The average age is 34 to 35 years. On the other hand, the tumour grows rather slowly and it is not infrequent for symptoms of epilepsy to have occurred for as long as seven to nine years before admission. The five-year–survival rate is 47 per cent, the ten-year rate is 32 per cent, and the thirteen-year rate is 5 per cent. If left to run its course, it will kill in nine years, and the survival after operation seems to

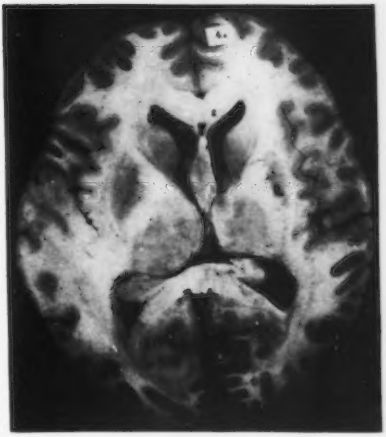

FIGURE 5. Astrocytoma diffusum showing diffuse invasion of the cerebral hemisphere. (From MOSELEY, H. F., Ed.: *Textbook of Surgery*, 2d ed., C. V. Mosby Co., 1955.)

be limited to the over-all survival regardless of the type of operation or of whether roentgen-ray therapy is used. Partial removal for biopsy and deep roentgen-ray therapy is generally employed. Of course, if total removal were possible, this would be better.

The astroblastomas form a small group and are intermediate in behaviour between the astrocytoma and the glioblastoma multiforme, to be described.

The second most common group of the gliomas is the glioblastoma multiforme. This is the most malignant type and one of the most frequently encountered. It forms one third of all the gliomas. It occurs most frequently in the fourth, fifth, and sixth decades. The average age is 44.8 years in cerebral cases.

In the author's opinion the type cell is the polar spongioblast, but the growth contains a great mixture of cells developing at various levels of maturity. There are frequently large areas of astrocytic and astroblastic growth. Many mitoses are present. There is much proliferation of capillaries and small vessels. Large areas of endothelial budding have given rise to the term "gliosarcoma" in the past. Ex-

FIGURE 6. Glioblastoma multiforme inoperable of mid-brain growing about a tube that has been used to keep communication clear between the third and fourth ventricles.

tensive areas of necrosis may occur within the tumour.

The tumour may present at the surface of the cortex or in the depth of the brain. Occasionally it may become adherent to the dura. It frequently passes along the corpus callosum to the opposite side. There seem to be certain sites of predilection, e.g., frontal lobe, medial frontal, parasagittal frontoparietal passing beneath central cortex, temporal, parietal. It is common in the cerebrum, uncommon in the cerebellum and brain stem (Fig. 6) and then may occur in a younger age group. They occur in the spinal cord. Intraneoplastic small and medium cysts may occur.

At the surface it may present an area of discolouration, translucency, and widening of convolutions. It can be outlined and separated to some extent from brain by blunt dissection and removed in large part in that manner, but the remainder has to be removed by suction.

The tumour is very invasive, but early it is discrete or focal in position. Grossly complete removals are made but tumours continue to recur locally.

Preoperative symptoms are reported on the average for five months before surgery. The onset is sometimes marked by an attack of la grippe and convulsion or some other symptom or sign. Further development may be extremely rapid. One wonders at times whether it is not really an infectious process.

In the author's opinion radical removal, especially for internal-decompression purposes, is desirable whenever possible. This is followed by roentgen-ray therapy, which appears to have a beneficial effect. When the tumour is localized to the speech areas, a biopsy made through a twist-drill hole for verification is all that can be done. An arteriogram may show the characteristic vascular markings and displacement (Fig. 7). Two-year survivals are frequent. Five-year survivals are infrequent and ten-year survivals almost unheard of and probably run not more than 1 per cent.

While the results are so discouraging in

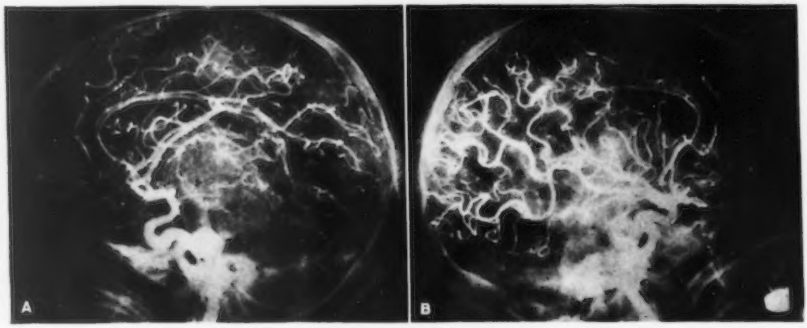

FIGURE 7. A, Glioblastoma multiforme seen by arteriography, showing characteristic vascular network and displacement of the middle cerebral vessels. B, Normal side for comparison. (From MOSELEY, H. F., Ed.: *Textbook of Surgery*, 2d ed., C. V. Mosby Co., 1955.)

this group, it is nonetheless perhaps the most interesting and challenging subgroup from a research point of view. It is extremely important to note that a few patients do actually survive for some years and apparently are cured of the growth. Is this due to an unusually complete removal or to some unknown factor that has stopped or failed the growth itself?

The third largest group of the gliomas are the so-called medulloblastomas, described by Bailey and Cushing (1925). The type cell is a "theoretical" medulloblast, a pear-shaped cell with a short tail, probably a variety of spongioblast. The nucleus half fills the cell and may contain dense chromatin, but in some areas it may be more vesicular and even suggest a cartwheel arrangement of chromatin reminiscent of a neuroblast. The tumour is thought by some to arise from granule cells of the cerebellum. The tumour grows in pure culture. Many mitotic figures occur and it is highly malignant.

Grossly the tumour frequently arises in the vermis of the cerebellum, no doubt from cell rests. It may arise from the lateral wall of the fourth ventricle and pass between the hemisphere and brain stem on either or both sides. It is essentially a mid-line tumour.

The tumour may metastasize freely up or down the cerebrospinal axis, so that a metastasis may occur as far away as the frontal pole and frequently along the spinal subarachnoid space. These tumours probably never metastasize beyond the central nervous system. Primary lesions seem to arise only in the posterior fossa from the cerebellum.

This is essentially a tumour of childhood but it does occur sometimes in older people. This raises the average age to 19, which gives an exaggerated impression.

Symptoms may occur for six months. Radical operative removal may be followed by many five-year survivals, even without roentgen-ray therapy. Recurrence is usual. Rare cases of cure are on record. Roentgen-ray therapy is very efficacious and the tumour can be reduced on successive occasions with roentgen-ray therapy alone. However, there are few long-term cases on record and only one or two presumed cures.

Some surgeons prefer to biopsy and irradiate. The author prefers to remove and irradiate.

There are several other smaller glioma subgroups. Each group, however, has its own peculiarities. Only a few of the most unusual and interesting differences of behaviour will be mentioned.

The oligodendroglioma is made up of oligodendroglial cells and usually occurs in the cerebral hemispheres. Some appear to be fairly benign but many are malignant. The preoperative symptomatology may extend over years, but postoperative survival may be comparatively short. The tumours may be radiosensitive.

The ependymomas are more common in the spinal cord. They may occur along the course of the ventricular system. They are generally benign, and they tend to reproduce ependymal lining or true cysts or true rosettes. If completely removed, they may not recur.

Polar spongioblastoma is somewhat similar in distribution. It occurs at a young age. It is a rare growth and the type cell is the polar or bipolar spongioblast. At times the cells stream in parallel fashion. They are more easily recognized by the use of silver staining techniques. This tumour is slow-growing and recurrence may not take place after radical removal.

The medulloepithelioma or neuroepithelioma is a rare growth that tends to imitate the primitive neuroepithelium. Sheets of cells occur that simulate strips of neuroepithelium and that often form true rosettes not unlike ependymomas. This is a highly malignant growth and most uncommon. It may also occur in children.

The pinealomas are classified as gliomas. They reproduce cells characteristic of the pineal gland. They vary in malignancy and are rather uncommon, usually occurring at a younger age. They are removed with difficulty and usually incompletely. They cause hydrocephalus from

Text continues on page 200.

GENERAL SYMPTOMS OF IN

recurrent headache

abrupt emesis

convulsions

INTRACRANIAL PRESSURE

vertigo

mental dullness,
emotional changes

double vision,
narrowing fields,
choked disc

pressure over the aqueduct of Sylvius. Some would prefer to treat them by a Torkildsen short-circuit operation in which the lateral ventricle is joined to the cisterna magna by a rubber or plastic tube. Results are probably better with a Torkildsen operation and deep roentgen-ray therapy once diagnosis is established by biopsy.

The gliomas are an infiltrating type of tumour growth (Fig. 2), tending to reproduce a type cell on a certain histogenetic level of growth. Some grow rapidly and others very slowly. They all tend to recur locally, but some, especially the astrocytomas of the cerebellum, will not recur if completely removed. In a few cases in the more malignant groups they have also failed to recur after radical removal.

The gliomas do not metastasize to other parts of the body. Some medulloblastomas have been so suspected but these may have been a different type of growth. On the whole, radical removal where possible, followed by roentgen-ray therapy, seems to afford the best results, with a few exceptional circumstances.

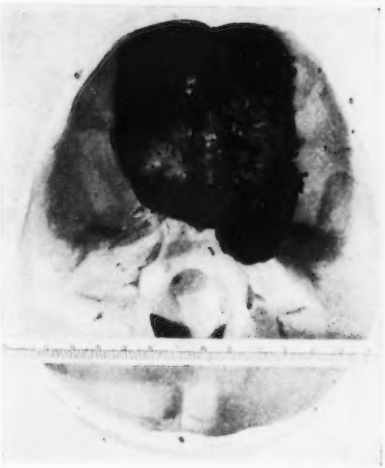

FIGURE 8. Huge meningeal fibroblastoma arising from both olfactory grooves. The patient was cured. The tumor was placed in a skull by Dr. Feindel to show the relative size and position of the growth.

Meningiomas

After the gliomas the next most important group of brain tumours are the meningiomas. These tumours actually arise from the dura mater and compress the brain as they grow. More strictly speaking they seem to arise from arachnoidal cells within the dura, especially from the site of pacchionian granulations. For this reason many of the tumours are formed of arachnoidal-like cells that, with some stretch of the imagination, appear to be forming arachnoidal villi. These type cells are mesodermal elements and they may form fibroglia fibres. Some tumours are made up of cells with a greater tendency to form fibrillae and because of this are called meningeal fibroblastomas.

The cells grow in parallel fashion and sweep about in eddies and whirls, sometimes forming psammoma bodies.

These growths arise grossly from the dura. They grow to enormous sizes with minimal symptoms (Fig. 8). They generally occur along the line of the great venous sinuses (Fig. 9), sometimes in the region of and about the fissure of Sylvius, from the falx, the tentorium, the olfactory groove (Fig. 8), the tuberculum sellae and the dorsum sellae, the floor of the middle fossa and the lesser wing of the sphenoid, the lateral petrous angle in the posterior fossa and the cerebellopontile angle, and the foramen magnum. The majority occur along the venous sinuses. In this event it frequently happens that they arise from a point just to the side of the sinus where, in fact, pacchionian granulations occur, even though they may be attached to the falx. This makes it possible to effect a more simple removal, as it makes it possible to section and clip the dura between the attachment of the growth and the sinus. These tumours displace brain. They are always covered by an arachnoidal-like tissue and in fact push pia arachnoid ahead of themselves. They tend to cause an irritative thickening of

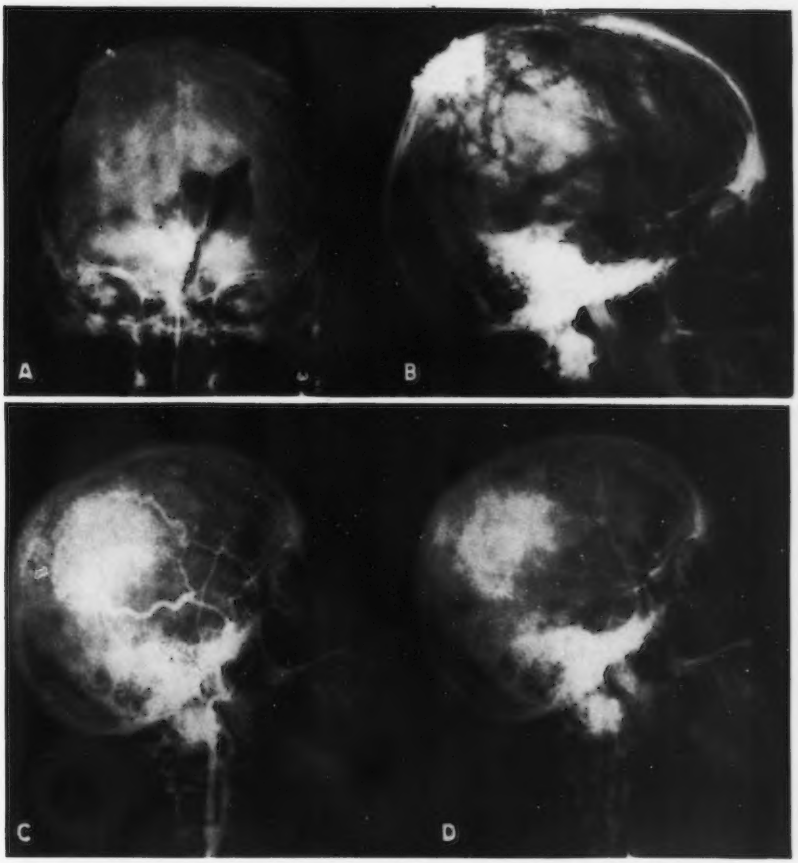

FIGURE 9. Case of a huge meningeal fibroblastoma. A, Ventricular shift. B, Large vascular channels within the skull and depression of the lateral ventricle. C, Arteriogram showing arterial supply to the tumour and the capillary opacification of the growth. D, Capillary blush still visible in the second plate. (From MOSELEY, H. F., Ed.: *Textbook of Surgery*, 2d ed., C. V. Mosby Co., 1955.)

the overlying bone, which on the one hand may become fenestrated with vascular channels and on the other associated with a stalactite formation of some considerable size, which can be seen in the roentgenogram.

The tumour cells may spread into the haversian canals and thicken the bone and even appear on the external surface of the skull, which in advanced cases may be recognized as a lump or a horn beneath the scalp. The tumour may also invade and block the sagittal sinus. This makes it essential in such a case, if a complete removal is sought and recurrence is to be avoided, to remove the affected dura, sinus, and bone. Areas of simple adherence to the falx may be coagulated but the involved falx may also be removed according to circumstances.

When these tumours are completely removed they will not recur. Tumours of

the base cannot always be totally removed. In these a partial removal, biopsy with or without deep roentgen-ray therapy, may give satisfactory results over the years. The fifth root may also be sectioned for pain.

These tumours grow to huge dimensions (Figs. 8, 9). A plastic repair of the dura may be appropriate and fascia can be obtained from the temporal region or the thigh for plastic closure of the dura, if desired. A cranioplasty may also be desirable.

In a few cases the tumour seems to have a more malignant tendency, grows more rapidly, and rarefies and destroys the bone. Such growths sometimes fall into the class of dural sarcomas. Again, if these are completely removed, they will not recur. However, recurrence is rapid if the tumour is not completely removed. A second try must then be made.

The meningiomas are technically difficult to remove. They have an abundant blood supply from the dura, bone, and scalp (Fig. 9).

The author advocates a ventriculogram for all tumours by twist drill, but for certain meningiomas an arteriogram is also of value to determine the course of the main arterial feeders (Fig. 9). In some clinics arteriography would be placed first.

Acoustic Neuromas

Another important group of tumours are the acoustic neuromas. These growths are perineurial fibroblastomas, made up of fibroblastic cells from the perineurium of the nerve root. It has been suggested that they arise at the point of junction of the perineurial sheaths and the sheaths of Schwann, with the oligodendroglial cells in the central roots. Most feel they are mesodermal growths. The cells form fibroglia and collagen; they run in parallel eddies and whirls. The tumours are firm, spherical, yellow, and on section may be a little necrotic. The seventh and eighth nerves may be seen stretched under the tumour. The tumour generally arises from an attachment within and widens the internal auditory canal. This makes it possible to diagnose it by simple roentgenography. These growths grow in spherical fashion toward the cerebellopontile angle and thus they compress not only the seventh and eighth nerves but also, early, the fifth cranial nerve and, later, the ninth, tenth, and eleventh groups.

The march of events and the physical findings and simple roentgenography of the internal auditory meatuses make the diagnosis almost certain. A ventriculogram further confirms the diagnosis.

These growths are benign. They are difficult to remove but when removed completely do not recur. The seventh nerve is often sacrificed in a complete removal. In this event it is usual to do a hypoglossal-facial anastomosis, in which case regeneration occurs in three months. Deafness can hardly be avoided.

Perineurial Fibroblastomas

Perineurial fibroblastomas may arise from other cranial-nerve roots but are rare. They occur frequently on the spinal-nerve roots.

Neurofibromas are very similar and often occur on more than one nerve root. They are generally whiter and firmer, may be multiple, and may fall into the category of a von Recklinghausen's syndrome. The nerve fibres tend to run through the growth rather than around its capsule. Again, if completely removed, they do not recur. The author has removed eight at one time from the posterior fossa without clinical recurrence after several years. Bilateral acoustic neuromas are known to occur and are thought to have a familial incidence. They may be perineurial fibroblastomas or neurofibromas. It is a formidable procedure to remove two at one time, and in this case it is essential to spare one seventh- and eighth-nerve root if possible and, of course, one vagus-nerve root.

Pituitary Tumours

Pituitary tumours can not be discussed in the space available. Suffice it to say that

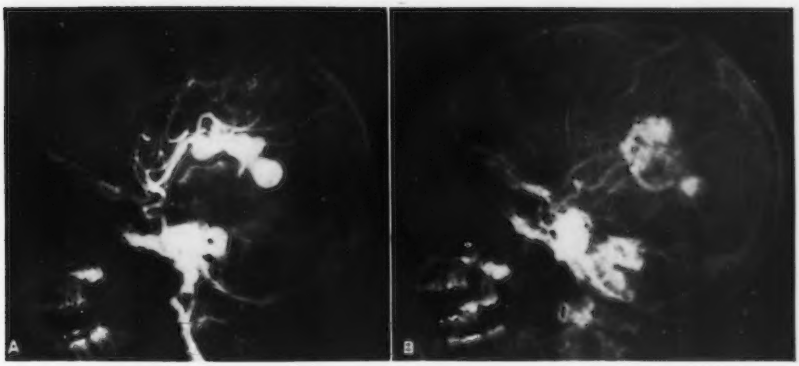

FIGURE 10. A, Arteriovenous angiomatous malformation fed by branches of the middle cerebral artery. B, Plate taken four seconds later in phlebographic stage. (From MOSELEY, H. F., Ed.: *Textbook of Surgery*, 2d ed., C. V. Mosby Co., 1955.)

partial operative removal and roentgen-ray treatment together with supportive endocrine therapy in the case of adenomas causing visual-field defects and headache are usual. Results are generally good and long survivals are the rule. Sometimes further operative or roentgen-ray therapy is necessary. Partial removal and occasionally complete removal of a craniopharyngioma can be made. Some drainage or short-circuiting operation into the ventricle can be devised for large irremovable craniopharyngiomas with cystic formation, and even marsupialization into the pharynx has been performed.

Angiomas

Angiomas are easily recognized by arteriography. They are mostly arteriovenous malformations (Fig. 10) rather than true tumours. They can be removed except in the more complex cases. Hemangioblastomas more nearly resemble tumours and usually occur in the cerebellum or brain stem and may be associated with a large cyst. If they are removed they do not recur.

Metastatic Tumours

The secondary metastatic tumours (Fig. 11) of the nervous system, when proved to be solitary and of good prognosis, may be removed, more especially to give relief of headache. Not much more than a year of survival can be expected.

Congenital Tumours

Rare congenital tumours, i.e., lipomas and dermoids and teratomas, can be removed in part or completely. They are essentially mid-line lesions that develop within the embryological cleavage planes. Papillomas can be removed from the lateral third or fourth ventricles.

Sarcomas

Sarcomas (perithelial) can be removed

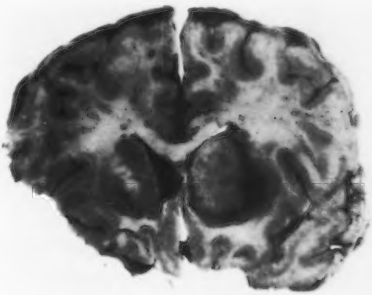

FIGURE 11. Inoperable metastatic carcinoma, single nodule, but placed in the corpus striatum.

but early recurrence is the rule. Deep roentgen-ray therapy can be employed but is of doubtful value.

Experience in clinical diagnosis, with expert diagnostic roentgen-ray work and with the verification by ventriculography and to a lesser degree by arteriography and to some extent by electrography, has made the problem of tumour localization usually relatively simple.

With accurate knowledge of anatomical localization, with the more recent advances in surgical technique and choice of procedure, and with improved techniques in the administration of deep roentgen-ray therapy, eradication of a tumour has become simplified.

The title does not include symptoms and signs but it may be said that, in spite of all technical advances, an accurate history and evaluation of symptoms and signs together with adequate experience, still remain the most important implements of diagnosis. Ventriculography and, when safe, encephalography are the most important technical aids at present and may be considered to be at least 90 per cent accurate when properly performed.

KINESCOPE: CANCER OF THE CENTRAL NERVOUS SYSTEM

J. LAWRENCE POOL, M.D.
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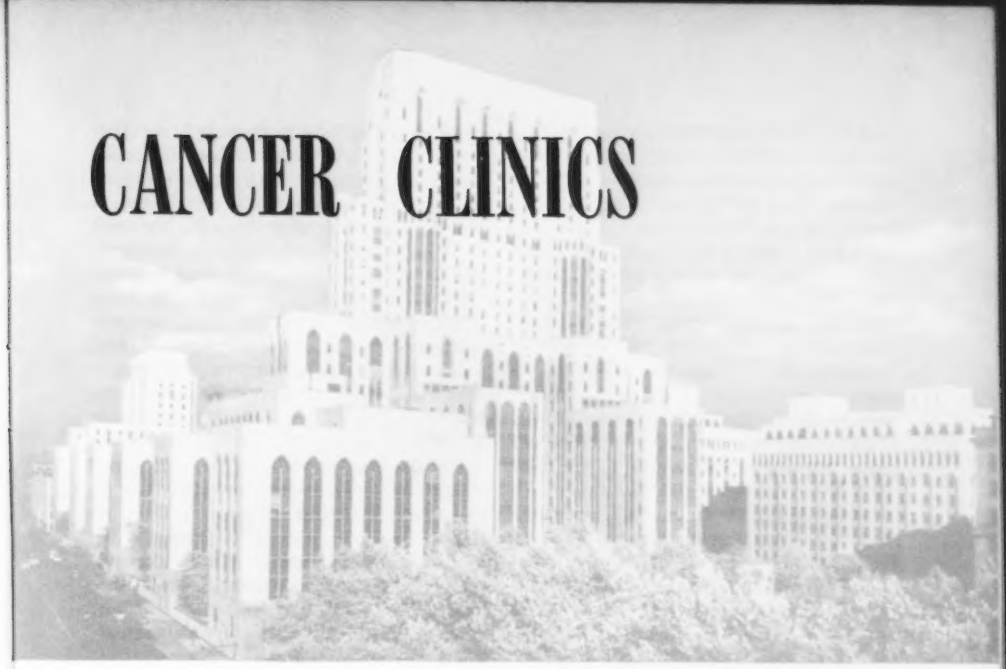
Cases are presented of primary and metastatic brain or spinal-cord tumors. The very early symptoms of brain tumor are discussed in terms of office practice. The program describes the value of neurosurgical procedures for pain relief in advanced cancer.

This kinescope (no. 13) is available through your Division of the American Cancer Society. Running time: 29 minutes; 16-mm. color with sound.

APPROVED FOR INFORMAL STUDY CREDIT BY THE AMERICAN ACADEMY OF GENERAL PRACTICE



Practitioners' Conference on Tumors of the Brain

Summarized by Chairman Claude E. Forkner, M.D.

Brain tumors are rare but their early discovery is of the greatest importance, since some brain tumors respond readily to treatment. A bruit is very rarely present as a manifestation of a brain tumor. It is heard most frequently over an angioma or an arteriovenous aneurysm, less frequently over a vascularized meningioma, and never over saccular aneurysms.

The three most important varieties of symptoms and signs associated with brain tumors are headaches, fits, and disturbances in speech:

Headache often is present but is not necessarily associated with increased intracranial pressure. Headache is more commonly due to interference by the tumor with a pain-sensitive structure. If not associated with increased intracranial pressure and papilledema, headache may be helpful in localizing a brain tumor. If unilateral it is usually on the side of the tumor. If occipital or nuchal it suggests that the tumor is subtentorial, i.e., below the layer of dura mater covering the superior surface of the cerebellum and separating the cerebrum from the cerebellum. If behind the ear it is suggestive of a tumor of the corresponding cerebellar pontine angle or acoustic nerve. It is not uncommon to have no headache in the presence of a brain tumor.

Fits (convulsions and transient disturbances in sensation, speech, and consciousness), except in patients with evidence of great increase in intracranial pressure, are manifestations of supratentorial lesions. When fits involve one side or specific parts of the body they may be helpful in localization. In general, the more anteriorly

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Chairman: Claude E. Forkner, Professor of Clinical Medicine. Panel Members: Bronson S. Ray, Professor of Clinical Surgery; Donald J. Simons, Associate Professor of Clinical Medicine; Lewis D. Stevenson, Professor of Clinical Neurology; and Harold G. Wolff, Professor of Medicine (Neurology).

tumors are situated, the more likely they are to induce fits. Usually, fits are much more commonly associated with brain tumor than with cerebral vascular accidents. They are uncommon with a subdural hematoma unless the brain is lacerated. Any patient more than 20 years of age who for the first time has a fit or fits must be considered as a brain-tumor suspect.

Speech disturbances are likely to be linked with lesions in the left cerebral hemisphere. In general, the more difficulties there are in expression, the more anterior the lesion is in relation to the temporal lobe. The more difficulties there are in perception or understanding, the more posterior is the lesion. Anomia is often associated with lesions of the left temporal lobe. Lack of capacity to understand the written word, even though vision is good, occurs with tumors in the occipital lobes. Lack of capacity to write words is associated with expressive defects and usually with lesions anterior to the Rolandic fissure.

Some other telling symptoms and signs may be associated with brain tumor:

Loss of smell when unilateral suggests tumor adjacent to the portion of the brain where the olfactory fibers enter—a frontal-lobe tumor on the same side as that of loss of smell.

Difficulties with the eyes are significant. If the trouble is with upward gaze, the tumor is in the quadrigeminal region or anterior portion of the midbrain. Failure to follow a moving object, even though the patient can fix his gaze while the head is rotated, is associated with lesions above the tentorium. Nystagmus never results from a lesion above the tentorium but is due to a disturbance in the brain stem. Nystagmus may occur with cerebellar tumors because of pressure exerted on adjacent vestibular structure. Unilateral nystagmus is uncommon and is rare except in multiple sclerosis. Visual-field defects mean supratentorial lesions, except in rare instances when there is very great increase in intracranial pressure from infratentorial lesions. Bitemporal defects indicate lesions around the pituitary fossa, whereas homonymous hemianopic defects indicate a lesion of visual pathways on the opposite side. Papilledema caused by increased intracranial pressure and papillitis caused by inflammation of the optic nerve near or just behind the globe look somewhat similar but are strikingly different in their effects on visual acuity. Papillitis is associated with striking defects in acuity, whereas good acuity is retained in papilledema in spite of some restriction of peripheral fields. The combination of optic atrophy on one side and papilledema on the other or difficulty in smelling together with mood and personality changes points to frontal-lobe tumor.

Pain in the face may be present with brain tumor when the pain is associated with a defect in sensory perception in the face. This usually indicates a tumor involving the pathway of the fifth cranial nerve.

Itching of the nose may be present on the side of an anterior-fossa tumor.

Sixth–cranial-nerve paralyses have little localizing value, since they result from a general increase in intracranial pressure.

The combination of loss of hearing, tinnitus, and true vertigo seldom means brain tumor. Labyrinth response to ice water is absent in patients with acoustic-nerve tumors.

When disturbances of unsteadiness owing to involvement of cerebellar function are coupled with defects in the seventh cranial nerve, a lesion involving the cerebellum and brain stem, often an intramedullary tumor, is suggested.

Vomiting without nausea is a late manifestation of increased intracranial pressure. Projectile vomiting may be seen, particularly in posterior-fossa tumors, but it is not common and not too much importance should be attached to it.

Tilting of the head is a common outward sign of a tumor in the back of the cerebrum on the side of the tilt.

Roentgenograms of the skull are abnormal in about 50 per cent of patients with brain tumors.

Lumbar puncture may be dangerous,

seldom is necessary, and usually is contraindicated in patients suspected of having brain tumor.

A pneumoencephalogram (air by lumbar route) should never be done if brain tumor is suspected. This is especially true if the spinal-fluid pressure exceeds 180 mm. of spinal fluid. Under such conditions a ventriculogram may be considered.

The use of radioactive materials for localization of brain tumors gives promise of usefulness.

Often it is difficult or impossible to differentiate headache that is the result of a brain tumor from simple vascular headache. Vascular or muscle-contraction headaches are likely to behave according to a regular pattern, whereas headaches caused by brain tumor represent a new experience. Vascular or muscle-contraction headaches are likely to be relieved by vasoconstrictor agents such as ergotamine tartrate or norepinephrine. Response of a headache to analgesics does not provide any indication concerning whether it is caused by tumor or by vascular dilatation.

Arteriograms made by injection of diodrast into the carotid artery permit visualization in roentgenograms of the middle cerebral, middle meningeal, anterior cerebral, and posterior cerebral arteries, thus giving evidence of any intracranial mass.

Meningiomas are rarely seen in childhood, occur occasionally in teenagers, and are primarily benign tumors of adult life. At times they involve vital structures, preventing cure by virtue of their location rather than by virtue of any intrinsic malignancy. Malignant tumors of the brain usually do not metastasize to other organs and, with the exception of spongioblastoma multiforme, do not resemble malignant tumors in other parts of the body. Gliomas are difficult to remove, since the limitations of their growth often are not evident and extension into unremovable areas is already present at the time of operation. Acoustic neuromas rarely occur in persons younger than 20 years. About 40 per cent of brain tumors are derived from astrocytes or their ancestors, the spongioblasts. Astrocytomas are relatively benign tumors often containing cysts with xanthochromic fluid. Removal of the tumor may be curative but recurrences are common. When recurrence ensues, the picture of a malignant spongioblastoma multiforme or of a glioma is often present.

The indications for operation, either resection or decompression, in cases of brain tumor are: to save or prolong life; to restore health, as in those tumors that can be completely removed; to save vision, as in pituitary tumors; and to relieve intractable pain or headache, as in removal of a metastatic lesion in the brain.

Pituitary tumors as a rule are not to be operated upon unless visual impairment is present.

In the neurosurgical clinic of The New York Hospital the percentages and types of brain tumors in patients operated upon are roughly as shown in Table 1.

In about half of these tumors one might reasonably hope for a cure, or at least a prolongation of life for many years without serious neurological defects.

Some intracranial tumors may exist for months and years before coming to recognition. This is especially true in meningiomas and in oligodendrogliomas. One such glioma at The New York Hospital was known to have been present for forty-five years. It is rare, however, for tumors to be found in the brain at autopsy that have not produced clinical symptoms.

Electroencephalography is valuable in

TABLE 1

Brain Tumors in Patients Operated upon in the Neurosurgical Clinic of The New York Hospital

Type of tumor	% of total cases
Gliomas of at least half a dozen varieties about half of which are malignant glioblastomas	45
Pituitary adenomas	10
Meningiomas	15
Acoustical neuromas	10
Metastatic tumors	6
Miscellaneous tumors	14

localizing supratentorial gliomas in about 80 per cent, and supratentorial meningiomas in 75 per cent, of cases. Rarely does the electroencephalogram suggest a tumor when bedside neurological examination is unremarkable. The electroencephalographic patterns are believed to arise from cortical cells. The abnormal record is that of a disturbance in the neighborhood of the lesion in the brain. A rapidly growing, infiltrating, and destructive lesion is likely to cause a marked disturbance, whereas a slow-growing tumor, such as a meningioma, may pass undetected. Normal brain waves have a rhythm of about ten per second and are of normal, moderate amplitude, whereas brain tumors are likely to show waves at a slower rate, usually one to three per second, less often five to seven per second, and are of double or triple amplitude. The electroencephalogram is not of great value, in the individual case, in differentiating cerebral hemorrhage or cerebral thrombosis from neoplasm. In general, the vascular lesions tend to show diffuse abnormalities, whereas tumors are likely to show more localized disturbances.

The ventriculogram is about 98.5 per cent accurate in localizing brain tumors but the test involves a minor operation and usually is performed just before a planned craniotomy, since delay is dangerous. All tests, such as with radioisotopes, angiograms, and electroencephalograms, have less diagnostic precision than the ventriculogram, but the latter is more of a procedure and is therefore perhaps more dangerous because withdrawal of fluid and replacement by air may bring about rapid changes in intracranial pressures.

The radioisotope diagnostic procedure is about 75 per cent accurate in localization of cerebral tumors but is much less accurate in mid-line or posterior-fossa tumors.

Jacksonian epilepsy starting in a particular part of the body and spreading to other parts differs from a focal seizure in that the focal seizure starts in one place and remains there. The part of the body first affected in a fit may provide an indication of localization of a tumor.

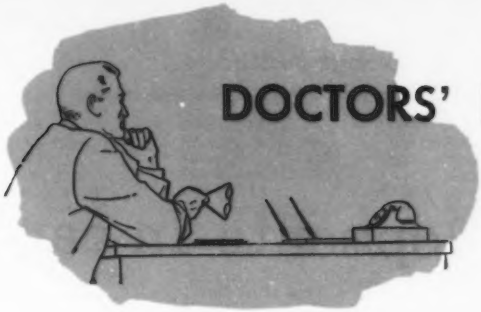
A tumor of the brain should arouse suspicion of a primary tumor in the lung, particularly in older people who have been heavy smokers for many years. This is because tumors of the lung may metastasize very early to the brain, before pulmonary symptoms appear.

Diagnosis in Absentia

An English doctor sent me a letter she had received about a relative in America who was becoming mentally disturbed and was being treated for hysteria. A letter written by the patient herself showed, among other evidence, unmistakable evidence of dysgraphia. I wrote to the English doctor suggesting that a left hemisphere cerebral tumour was likely, and that a good brain surgeon should be consulted without delay. This advice duly crossed the Atlantic, and was acted on with remarkable speed despite considerable resistance from the patient's advisers. Two and a half weeks after the first letter was written a cable was received in England: "Successful removal benign brain tumour, size of egg." Apparently the patient was critically ill at the time of operation and a malignant tumour seemed likely, but at operation a large meningioma was easily removed from the surface of the brain, and complete recovery followed.

In medical work it is sometimes the simplest acts which are of most consequence.

Anon: In England Now; a Running Commentary by Peripatetic Correspondents. Lancet 1:45, Jan. 1, 1955.



DOCTORS' DILEMMAS

Q *Should the Papanicolaou smear and cervical biopsy be obtained routinely in all patients with chronic cervicitis?*

A Unsuspected early cancer often coexists with benign cervical disease, and therefore cervical and vaginal smears should, if possible, be obtained from all women with chronic cervicitis. If findings are suspicious or positive, cervical biopsy should be performed, and no treatment should be instituted before the biopsy report has been received. The period of delay involved is usually very short, and a repeat biopsy, if requested by the pathologist, can be obtained from areas that have not been destroyed by treatment. Of course, the smear should not replace the biopsy as the first step should there be the slightest suspicion of cancer.

Q *My patient developed bronchial pneumonia after an upper respiratory infection. The roentgenogram of the chest showed patchy infiltration in the left lower lobe and enlargement of the hilum, which had not been noted on roentgen-ray examination six months previously. Three sputa failed to show tuberculosis or cancer cells. Over the succeeding six weeks the bronchial infiltration has cleared and the hilar prominence has diminished. Tomograms show smooth shadows that could be vascular. Bronchoscopy is completely negative, except for the impression of some fixation of the trachea on the left. Bronchial washings are graded Papanicolaou 1. The patient has had chronic bronchitis, possibly bronchiectasis, complicated by bronchiospasm, and continues to have a disturbing cough that is controlled by epinephrine inhalants. Is there any way of determining whether these findings are due to cancer, or could they conceivably occur as the result of so-called virus pneumonia?*

A The only certain solution to your problem would be for your patient to have an exploratory thoracotomy. The morbidity and mortality from this procedure are so low that it would be considered justified by some in this case. On the other hand, the facts that the size of the lesion appears to be decreasing, that bronchoscopy is negative, and that bronchial washings yield only normal cells would be considered by most chest physicians to indicate the more conservative course of watching, with frequent repeat chest roentgenograms and sputum studies.

Q *Should a dentist biopsy a lesion of the gum that the patient states has been present for two weeks?*

A In general, it is recommended that the biopsy be performed by the person who will be responsible for planning the treatment of the patient. However, if by performing a biopsy the dentist can prevent untoward delay in establishing a diagnosis, he should proceed.

new developments in cancer

The Atom and Heredity . . .

The Atoms for Peace Conference in Geneva dwelt in considerable detail on the genetic hazards of the Energy Era that the world seems to be entering. Almost all speakers seemed to feel that human mutations would be one unwanted but inevitable product of stepped-up use of atomic energy. It was felt that we would be subject to radioactive particles emanating directly from the wastes of atomic-power plants, that undersea currents would carry radioactivity to our coasts and fishing grounds from wastes buried in the deepest oceans, and that there is a strong possibility of leakage into plants and to the surface from wastes buried far underground. Industrial accident and nuclear runaway also were considered.

Here are a couple of the reports:

Whereas a particular mutant might appear only once in a hundred years, by radiation it is possible to increase the frequency as much as 100-fold, making it possible to induce desired mutants perhaps in one year. Hence, evolution can be accelerated.—*Singleton and others, Brookhaven.*

For a long period, induced changes were considered by most workers to lead to a breakdown of the hereditary material, the induced mutations thus being exclusively "harmful," this word taken in the sense that the individuals, mutants, would be, if not entirely monstrous or lethalized, at least distinctly inferior to the original type as regards viability. It is a fact, indeed, that most of the induced mutations decrease viability in the homozygous state (i.e., when the mutated gene is present in the double dose) and also that many mutations that are lethal when homozygous show a more or less detrimental effect in the heterozygous state. But such a type of behavior prevails in spontaneous mutations too. It ought to be pointed out that many mutations that, from the traditional point of view, should be regarded as deleterious, since they cause lethal effects when homozygous, will increase viability when heterozygous. The induction of mutations by ionizing radiations has given and can give hereditary changes of high production capacity in agricultural plants. —*Ehrenberg and others, Stockholm.*

scribed his procedures as clinically safe and reliable and as offering some specific advantages that internal deep radiotherapy does not. He found them particularly helpful in ovarian cancer, but he added that cures are possible only when treatment was early.

Brucer (Oak Ridge) cited the radioisotopes europium, cobalt, and cesium as having properties that make them especially valuable in teletherapy. Europium, he said, is weaker than cobalt 60, but extremely large amounts of activity are incorporated in small volumes. Cesium 137, a waste material of nuclear reactors, must first be separated from reactor-fuel elements. It has a half-life of thirty-five years, which gives it some advantage over cobalt and europium.

Farr, Robertson, and Stickley (Brookhaven) injected nineteen brain-tumor patients with boron and exposed them to neutrons from a reactor. The boron concentrates preferentially in tumor tissue, captures the neutrons, and disintegrates into lithium and helium. It is believed each disintegration can destroy a cancer cell. Patients have been treated by these investigators since 1951.

Andrews, Kniseley, Palmer, and Kretchmar (Oak Ridge) reported that radioactive yttrium and lutecium behave in the body very much as does radiogold and they are cheaper and less risky to handle than gold. It remains to be seen whether their radiation, slightly different from that of radiogold, is superior.

Brucer, Eldridge, and Trombka (Oak Ridge) described an entertaining method of checking physicians' ability to determine glandular uptake of radioactivity. They have built seven half-body mannequins with artificial "thyroid glands" that take up a "mock radioiodine" (radioactive barium and cesium, with half-life of more than ten years). During the next year they will ship these radioactive mannequins to seven different institutions that will make, in all, between 300 and 400 tests. The traveling mannequins will serve the purpose of checking on the tests' accuracy, and it is hoped that out of the effort will come a simple means of measuring radioactivity uptake that may be used by any physician.

Brucer also gave cost and performance charts for teletherapy units; he cited as isotopes showing promise (besides cobalt) cesium 137, europium 152 and 155, and cerium 144. He concluded that "it is apparent that radio-

isotope teletherapy devices are practical machines that can be used wherever the x-ray generators have previously been used. It is also apparent that they have a potential usefulness far beyond that of the present devices." He liked particularly the economy of isotopes and the fact that small teletherapy units can be used virtually everywhere.

One of the papers that attracted considerable foreign comment was Brownell and Sweet's (Mass. General Hosp.) diagnosis of brain tumors with the positron-emitting isotope of arsenic. Brain lesions take up ten times as much arsenic as normal brain. (A few other organs like the thyroid and the liver also concentrate it.) Twin scintillation counters, one on each side of the head, record the back-to-back emission of radioactive arsenic, and, as the scanning proceeds, the concentration of radiation is automatically recorded on a chart. Verified accuracy of diagnosis is 80 per cent -- 95 per cent in the case of meningiomas.

Latarjet and Lamerton (Pasteur Institute) described an ingenious method of determining the biological effects of cosmic radiation. They scaled Mount Blanc (Latarjet is an avid skier and mountain climber) and left cultures of sewage bacteria there, marked with radioactive uranium so that they could be located and recovered one year hence when the scientists return. At this altitude (about 15,000 feet), the bacteria will receive about one roentgen unit of radiation (from cosmic rays) per year. This particular strain of bacteria contains a virus that remains dormant in the absence of radiation but, with ionizing rays, the viruses proliferate and lyse the host cell. From the number of lysed cells (indicating virus proliferation), the scientists hope to tell how much biological effect cosmic rays have.

COMING MEDICAL MEETINGS

Date	Meeting	City	Place
1955			
Nov. 29-Dec. 2	Clinical Meeting, American Medical Association	Boston	Mechanics Hall
Dec. 2	Scientific Session, Annual Meeting Oklahoma Division, American Cancer Society	Oklahoma City	Huckins Hotel
Dec. 3-8	American Academy of Dermatology and Syphilology	Chicago	
Dec. 11-16	Radiological Society of North America	Chicago	
Dec. 12-14	American Academy of Obstetrics and Gynecology	Chicago	Conrad Hilton Hotel
Dec. 26-31	American Association for the Advancement of Science	Atlanta, Ga.	
1956			
Mar. 22-23	Mid-west Cancer Conference	Wichita, Kans.	Broadview Hotel
Apr. 9-11	American Radium Society	Houston, Tex.	Hotel Shamrock
June 4-6	Third National Cancer Conference cosponsored by National Cancer Institute and American Cancer Society, Inc.	Detroit	Sheraton-Cadillac Hotel

The Sheraton-Cadillac Hotel
Detroit, Michigan

Meeting place of the
Third National Cancer Congress
June 4, 5, 6, 1956

Sponsors:
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A complete program will be available from the sponsors about December 1, 1955.

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PRINTED IN THE UNITED STATES BY PACE PRESS, INC., NEW YORK, NEW YORK

Proceedings of the Second National Cancer Conference

The Second National Cancer Conference held in March, 1952, was sponsored by the American Cancer Society, the National Cancer Institute of the U. S. Public Health Service, and the American Association for Cancer Research. Its chief purpose was to bring together clinicians and investigators concerned with all facets of the cancer problem in an effort to appraise progress made and the current status of cancer research and clinical cancer.

Comment from the A.M.A. ARCHIVES OF INTERNAL MEDICINE

To attend and hear the papers of a National Cancer Conference is a great privilege to all interested in the problems of malignant disease. To those fortunately present, and more so to those unable to attend, the Proceedings are an amazing source of information and thoughts on cancer, both from the viewpoint of short summaries bringing general information up to date to that of current knowledge of possible etiology, behavior, and therapy and its results. . . . I unhesitatingly recommend the two volumes I am reporting here. They are comprehensive and written by men of longstanding investigative interest in various aspects of malignant disease. . . .

In Part III two round-table discussions are reported. The first one, on the significance of statistical analysis of end-results in the treatment of breast cancer sounds possibly boring, but it is alive from beginning to end. In his thought-provoking comments, Dr. James C. Lees, of England, states, among other things, that, "although treatment of cancer is based on the axiom that the earlier the treatment the better the chance of cure, it is disconcerting to find that this cannot be established numerically at all". . . .

The second panel offers a brief but practical knowledge of steroid endocrinology in relation to breast, female genital tract, and genitourinary malignant disease. Dr. Paul Wermer's conclusions on the best curative and palliative measures for carcinoma of the breast well summarize a vast amount of experience by many groups of investigators.

Part IV deals with panel meetings on the following subjects: breast, genitourinary tract, head and neck, lymphoma-leukemia, female genital tract, gastrointestinal tract, lung, radiology, genetics, cytology, chemotherapy, virology, steroids, and isotopes.

Each one of these offers a comprehensive treatise. For example, the 35 speakers on the breast panel covered the disease from demography and the use of tissue culture in the study of exfoliative cytology, with special reference to nipple secretion, to the indications for, technique, and results of every form of treatment and their combination known today. . . .

The value of these two volumes cannot be praised too highly. They should be in the library of every physician dealing with cancer, each chapter to be read at an opportune time to absorb the important material offered and store it for future use.

Proceedings of the Second National Cancer Conference, 1687 pages, two volumes. $7.50 per set.

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